

DBP indicate systolic and diastolic intracoronary pressure. Remodeling ratio (RR); VA proximal reference VA, remodeling index (RI); (VA/mean reference VA) / (PA/mean reference PA) and eccentricity index; maximum/minimum plaque were also calculated. Univariate and multivariate regression analysis was performed to select the best determinant of coronary compliance and stiffness index.

Results: The variables which showed p value < 0.2 by univariate analysis were used as independent variables in the multivariate model. Using multivariate regression analysis, the independent determinants of coronary compliance were maximum plaque thickness ($p=0.0007$), age ($p=0.0035$), PA ($p=0.0052$), eccentricity index ($p=0.0098$) and arc of calcium ($p=0.0325$). Only age ($p=0.0075$) and arc of calcium ($p=0.0524$) were the independent predictors of stiffness index β .

Conclusions: Major determinant factors of coronary compliance in de novo coronary artery lesions were maximum plaque thickness, age, plaque area, lesion eccentricity and arc of calcium.

1077-195

Endovascular Impedance Spectroscopy: A New Technique for Tissue Imaging

Tim Sueselbeck, H. Thielecke, I. I. Weinschenk, A. Mack, T. Stieglitz, A. Robitzki, J. Metz, Martin Borggreffe, K. K. Haase, Mannheim University Hospital, University of Heidelberg, Mannheim, Germany, Fraunhofer Institute for Biomedical Engineering, St. Ingbert, Germany

Background: Impedance spectroscopy (IS) can provide information on the cellular composition of tissue. We tested the hypothesis that endovascular IS can identify cell proliferation after vascular injury in an animal model.

Methods: 17 stents (Jotex, 3.0 mm diameter) were implanted in the iliac arteries of 11 rabbits to induce restenosis. After 28 days and 56 days the electrical impedance was measured in the stented arteries by using a balloon catheter with integrated micro electrodes and an impedance measurement system (impedance analyzer Solartron 1260 in combination with the bioimpedance interface Solartron 1294). After passage of the stent the balloon was inflated using a pressure of 1 atm to achieve a close contact to the arterial wall. The impedance was recorded at a frequency ranging from 1 Hz to 1 MHz. Afterwards the stents were explanted and histomorphometry was performed. The difference of the impedance inside and outside the stent was analyzed and compared with the histomorphometric data. **Results:** 28 days after stent implantation the difference of electrical impedance between the native and the stented vessel segment was 3689 ± 1480 Ohm with a corresponding morphometric luminal restenosis of 7.5 ± 4.3 % in the stented arterial segment. After 56 days the luminal restenosis was significantly higher 9.9 ± 3.6 % ($p=0.02$) and the impedance increased to 8637 ± 7624 Ohm ($p=0.09$). **Conclusion:** Endovascular IS can be performed by a balloon catheter with integrated electrodes and allows the detection of tissue proliferation after stent implantation.

1077-196

Prediction of Myocardial Infarct Size in Patients With Acute Myocardial Infarction by Coronary Flow Velocity Patterns Immediately After Percutaneous Coronary Intervention

Atsushi Yamamoto, Takashi Akasaka, Koichi Tamita, Kenji Yamabe, Minako Katayama, Motoaki Ikuji, Kunihiko Nagai, Tomoko Tani, Kazuaki Tanabe, Shigetomi Morioka, Kobe General Hospital, Kobe, Japan, Kawasaki Medical School, Kurashiki, Japan

Background: Our recent studies have shown that coronary flow velocity showing a rapid diastolic deceleration time (DDT) implies the presence of advanced microvascular damage. On the other hand, severe microvascular damage is one of the major risk factors of infarcts of a large size. However, the relation between myocardial infarct size and coronary flow velocity patterns has not yet been investigated in a large number of patients as yet. The aim of this study was to determine whether the assessment of DDT immediately after coronary reflow may predict myocardial infarct size in patients with acute myocardial infarction (AMI).

Methods: One hundred and sixty-seven consecutive patients with first anterior AMI were studied after successful percutaneous coronary intervention (PCI) within 24 hours of onset. We measured coronary flow velocity immediately after successful PCI using a Doppler guidewire. Patients were divided according to the DDT into two groups: Group 1 ($n=116$) with a DDT of > 600 ms and Group 2 ($n=51$) with a DDT of ≤ 600 ms. Serum creatine kinase (CK) and serum creatine kinase of myocardial origin (CK-MB) were measured serially every 3 hours after recanalization until a peak value was obtained.

Results: Peak CK levels and CK-MB levels were significantly higher in Group 2 than in Group 1 (6698 ± 2244 IU/L vs 2793 ± 2338 IU/L, $p < 0.001$; 688 ± 257 IU/L vs 256 ± 192 IU/L, $p < 0.001$, respectively). The sensitivity and specificity of a DDT of ≥ 5000 IU/L in peak CK were 71% and 90%, respectively. The sensitivity and specificity of a DDT of ≥ 500 IU/L in peak CK-MB were 80% and 93%, respectively. A significant inverse correlation was found between DDT and Peak CK-MB levels ($r = -0.65$; $p < 0.001$).

Conclusions: These findings suggest that the assessment of DDT using a Doppler guidewire can be used to predict the myocardial infarct size at the time of recanalization.

1077-197

Fractional Flow Reserve Measurement After Coronary Stenting in Patients With Hypertension and Diabetes: Insights From a Large Multicenter Registry

Johannes Rieber, Nico H. Pijls, Bernard De Bruyne, Petra Erdin, Uwe Siebert, Volker Klaus, Medizinische Klinik University of Munich, Munich, Germany, Harvard Center for Risk Analysis, Harvard School of Public Health, Boston, MA

The measurement of fractional flow reserve (FFR) is a well established method to evaluate the functional severity of coronary lesions. Recently, it could be demonstrated in a large patient cohort, that a FFR ≥ 0.9 after coronary stenting is associated with a low event rate during 6 month follow up. However, the presence of diabetes or hypertension was commonly seen as limitation for the use of FFR due to the high prevalence of

microvascular dysfunction or left ventricular hypertrophy in these patients. The aim of the present study was to evaluate the predictive value of FFR measurement after coronary stenting for the occurrence of adverse cardiac events in diabetic or hypertensive patients.

Methods: 745 patients (61 ± 11 years) were included in a multicenter registry. The only inclusion criteria was the measurement of FFR after optimized angiographically guided coronary stenting ($< 10\%$ residual stenosis by visual estimation). Patient characteristics were reported using a standardized report form. Primary endpoint was the occurrence of major adverse cardiac events (PTCA, CABG, myocardial infarction, death) during 180 day follow up.

Results: A clinical follow-up was obtained in all patients. Post-interventional FFR was ≥ 0.90 in 543 patients (73%). Hypertension or diabetes or the combination of both was present in 283/55% patients (DH). Neither diabetes nor hypertension was found in 205 (38%) patients (N). All other patient characteristics as well as angiographic parameters were equally balanced. During follow up 30 major adverse cardiac events occurred (14 PTCA/CABG, 4 myocardial infarction, 2 death). Event rate was not significantly different between both groups ($4.6\%[\text{DH}]$ vs $1.9\%[\text{N}]$; $p=0.12$).

Conclusion: The measurement of FFR after stent implantation is also valid in patients with diabetes or hypertension. The post intervention FFR remains the strongest predictor of adverse cardiac events during follow up.

1077-198

Physiologic Interrogation of Transplant Arteriopathy: Final Results

William F. Fearon, Mamoo Nakamura, David P. Lee, Mehrdad Rezaee, Randall H. Vogel, Sharon A. Hunt, Peter J. Fitzgerald, Paul G. Yock, Alan C. Yeung, Stanford University, Stanford, CA

Background: It is now possible to measure coronary flow reserve (CFR), using a validated coronary thermodilution technique, at the same time as fractional flow reserve (FFR) and with a single coronary pressure wire. This may represent a relatively simple and more thorough means of invasively evaluating for cardiac transplant arteriopathy.

Methods: In 30 asymptomatic cardiac transplant patients, coronary angiography and intravascular ultrasound (IVUS) imaging were performed in the left anterior descending artery (LAD). FFR was measured using intracoronary (IC) adenosine or papaverine. Thermodilution CFR was measured using the same coronary pressure wire and modified software, which allows the pressure transducer to act as a distal thermistor and the shaft of the wire as a proximal thermistor. The mean transit time of room temperature saline injected down the LAD was calculated based on the thermodilution curve at rest and after 15 mg of IC papaverine. Thermodilution CFR is defined as the ratio of the resting to the hyperemic mean transit time and has been shown to correlate with Doppler wire-derived CFR. A blinded core lab performed quantitative coronary angiography (QCA) and 3-D IVUS analysis.

Results: QCA revealed no LAD stenosis $> 37\%$. The average FFR was 0.89 ± 0.07 (2/30), had an FFR less than the ischemic threshold of 0.75 ($p=NS$), and 73% (22/30) had an FFR less than the normal cutoff of 0.94 ($p < 0.0001$). FFR correlated best with IVUS-derived maximum lumen area ($r=0.64$, $p=0.0003$). FFR also correlated with IVUS-derived lumen volume ($r=0.55$, $p=0.002$), and inversely with % plaque volume ($r=-0.50$, $p=0.007$). The average CFR in 26 patients was 2.1 . Fifty-four percent (14/26) had a CFR < 2.0 ($p < 0.0001$), while in 15% (4/26) ($p=0.12$), CFR was < 2.0 and FFR was ≥ 0.94 , suggesting pure microcirculatory dysfunction. FFR did not correlate with CFR.

Conclusion: FFR correlates with IVUS findings and is abnormal in a significant proportion of asymptomatic cardiac transplant patients with normal angiograms. Simultaneous CFR, measured using a coronary thermodilution technique, adds information regarding the status of the microcirculation.

1077-199

The Prognostic Value of Stenosis Resistance Index After Deferral of Percutaneous Transluminal Coronary Angioplasty in Intermediate Coronary Lesions Showing Discordant Results Between Fractional and Coronary Blood Flow Velocity Reserve

Martin Meuwissen, Steven A. Chamuleau, Jan G. Tijssen, Jan J. Piek, Academic Medical Center, Amsterdam, The Netherlands

Background: Prospective studies have shown a low event (5-10%) rate after deferral of PTCA when a normal fractional flow reserve (FFR, ≥ 0.75) or a normal coronary flow velocity reserve (CFVR, ≥ 2.0) is measured. However, patients with intermediate coronary lesions with discordant results between FFR and CFVR showed a significantly higher event rate. Hyperemic stenosis resistance index (SRV) based on a combination of both intracoronary flow and pressure may be a promising parameter for safe deferral in these patients.

Methods: Coronary pressure and flow velocity was measured distal from 200 intermediate coronary lesions (mean diameter stenosis of 55%) during baseline and maximal hyperemia.

FFR was defined as the ratio of mean distal pressure (Pd) to mean aortic pressure (Pa) during maximum hyperemia, CFVR was defined as the ratio of hyperemic to baseline flow velocity (APV) and SRV was defined as the ratio of hyperemic stenosis pressure gradient (Pa-Pd) divided by hyperemic APV. Deferral of PTCA was performed based on both a normal FFR and CFVR (group A, $n=119$), a normal FFR with an abnormal CFVR (group B, $n=27$) and an abnormal FFR and a normal CFVR (group C, $n=26$). PTCA was performed in 28 lesions.

Patients were followed for one year to document major adverse cardiac events (MACE: cardiac death, myocardial infarction (MI), CABG, PTCA) related to the intermediate lesion.

Results: Sixteen (9%) major MACE (5 MIs, 2 CABGs and 9 PTCA) occurred during a mean follow up of 326 ± 82 days. Significantly more events occurred in group B and C (22% and 19%) compared to group A (4%, $p < 0.001$). In lesions with discordant results